Chapter 4 Removal and Replacement

This chapter discusses removal and replacement procedures for the HP Workstation xw4200. This chapter includes the following sections:

Service Considerations

The following sections discuss service considerations that should be reviewed and practiced before removing and replacing any system components.

WARNING! When lifting or moving the workstation, do not use the front bezel as a handle or lifting point. Lifting the workstation from the front bezel or lifting it incorrectly could cause the unit to fall and harm the user and damage the workstation. To properly and safely lift the workstation, lift it from the bottom of the unit.

Read Cautions, Warnings, and Safety Precautions

For your safety, you must review the "Important Safety Warnings" on page vii before accessing the components of the workstation. Also, review the *Safety and Regulatory Guide* that came with your workstation for more information.

Electrostatic Discharge Information

A sudden discharge of static electricity from your finger or other conductor can destroy static-sensitive devices or microcircuitry. Often the spark is neither felt nor heard, but damage occurs. An electronic device exposed to electrostatic discharge (ESD) might not appear to be affected at all and can work perfectly throughout a normal cycle. The device might function normally for a while, but it has been degraded in the internal layers, reducing its life expectancy.

Networks built into many integrated circuits provide some protection, but in many cases, the discharge contains enough power to alter device parameters or melt silicon junctions.

Generating Static

The following table shows that:

- Different activities generate different amounts of static electricity.
- Static electricity increases as humidity decreases.

Table 4-1 Generating Static Electricity

	Relative Humidity		
Event	55%	40%	10%
Walking across carpet	7,500 V	15,000 V	35,000 V
Walking across vinyl floor	3,000 V	5,000 V	12,000 V
Motions of bench worker	400 V	800 V	6,000 V
Removing bubble pack from PCB	7,000 V	20,000 V	26,500 V
Packing PCBs in foam-lined box	5,000 V	11,000 V	21,000 V

NOTE: 700 volts can degrade a product.

Preventing Electrostatic Damage to Equipment

Many electronic components are sensitive to ESD. Circuitry design and structure determine the degree of sensitivity. The following packaging and grounding precautions are necessary to prevent damage to electric components and accessories.

- Transport products in static-safe containers, such as tubes, bags, or boxes to avoid hand contact.
- Protect all electrostatic parts and assemblies with conductive or approved containers or packaging.
- Keep electrostatic sensitive parts in their containers until they arrive at static-free stations.
- Place items on a grounded surface before removing them from their container.
- When handling or touching a sensitive component or assembly, ground yourself by touching the chassis.
- Avoid contact with pins, leads, or circuitry.
- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

Personal Grounding Methods and Equipment

To prevent static electricity damage to equipment, use the following equipment:

- Wrist straps are flexible straps with a maximum of one-megohm ± 10% resistance in the ground cords. To provide proper ground, wear the strap against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.
- Heel straps, toe straps, and boot straps can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use them on both feet with a maximum of one-megohm ± 10% resistance between the operator and ground.

The following table shows static shielding protection levels.

Table 4-2 Static Shielding Protection Levels

Method	Voltage
Antistatic plastic	1,500
Carbon-loaded plastic	7,500
Metallized laminate	15,000

Grounding the Work Area

To prevent static damage at the work area:

- Cover the work surface with approved static-dissipative material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.
- Use static-dissipative mats, foot straps, or air ionizers to give added protection.
- Handle electrostatic sensitive components, parts, and assemblies by the case or PCB laminate. Handle them only at static-free work areas.
- Turn off power and input signals before inserting and removing connectors or test equipment.
- Use fixtures made of static-safe materials when fixtures must directly contact dissipative surfaces.

- Keep work area free of nonconductive materials such as ordinary plastic assembly aids and Styrofoam.
- Use field service tools, such as cutters, screwdrivers, and vacuums, that are conductive.

Recommended Materials and Equipment

Materials and equipment that are recommended for use in preventing static electricity include:

- Antistatic tape
- Antistatic smocks, aprons, or sleeve protectors
- Conductive bins and other assembly or soldering aids
- Conductive foam
- Conductive tabletop workstations with ground cord of one-megohm ± 10% resistance
- Static-dissipative table or floor mats with hard tie to ground
- Field service kits
- Static awareness labels
- Wrist straps and footwear straps providing one-megohm ± 10% resistance
- Material handling packages
- Conductive plastic bags
- Conductive plastic tubes
- Conductive tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes

Tools and Software Requirements

To service the workstation, you might need the following equipment:

- Torx T-15 screwdriver or Flat-bladed screwdriver (can be used in place of the Torx screwdriver)
- Phillips screwdriver (to remove the rear fan, if necessary)
- Diagnostics software
- Tamper-resistant T-15 wrench (FailSafe key) or tamper-resistant bits (required if you get locked out by the solenoid hood lock)

Screws

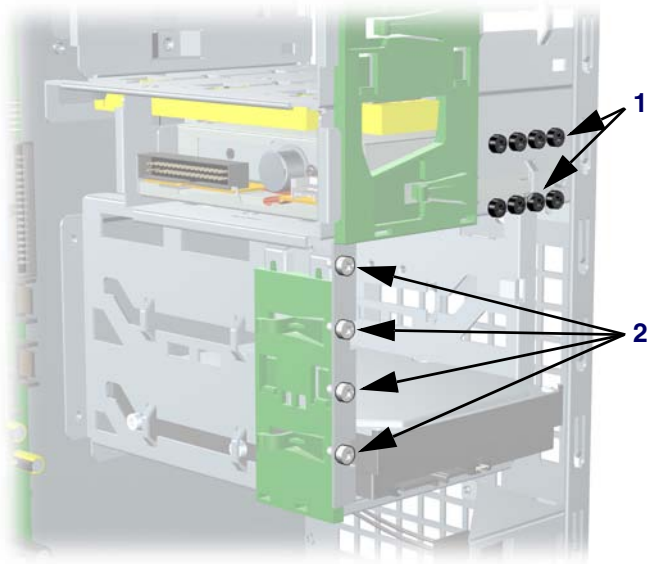
The screws used in the workstation are not interchangeable. The screws might have standard or metric threads and might be of different lengths. If an incorrect screw is used during the reassembly process, it can damage the unit. HP recommends that all screws removed during disassembly be kept with the part that was removed, then returned to their proper locations.

NOTE Metric screws have a black finish. American National (unified) screws have a silver finish.

NOTE As each subassembly is removed from the workstation, place the subassembly away from the work area to prevent damage.

If necessary, additional drive guide screws are provided on the system chassis. There are eight Metric screws located on the chassis near the 5.25-inch optical drive bays. These screws can be used to mount additional optical drives or an optional diskette drive. There are four American National screws located on the chassis near the hard drive. These screws can be used to mount additional hard drives in the 3.5” hard drive cage. For more information about this procedure, see “Installing Hard Drives in the 5.5” slot (Optional)” on page 112.

NOTE The Metric (black) and American National (silver) screws are not interchangeable.



1	Metric screws (8)
2	American National screws (4)

Special Handling of Components

The following components require special handling when servicing the workstation.

WARNING! Do not use the front bezel as a handle or lifting point when lifting or moving the workstation. Lifting the workstation from the front bezel or lifting it incorrectly could cause the unit to fall and cause harm to the user and damage to the workstation. To properly and safely lift the workstation, lift it from the bottom of the unit from either the desktop or minitower configuration.

Cables and Connectors

Cables must be handled with care to avoid damage. Apply only the tension required to seat or unseat the cables during insertion or removal from the connector. Handle cables by the connector whenever possible. In all cases, avoid bending or twisting the cables, and ensure that the cables are routed in such a way that they cannot be caught or snagged by parts being removed or replaced.

CAUTION When servicing this workstation, ensure that cables are placed in their proper location during the reassembly process. Improper cable placement can damage the workstation.

Hard Drives

- Handle hard drives as delicate, precision components, avoiding all physical shock and vibration. This applies to failed drives as well as replacement spares.
- If a drive must be mailed, place the drive in a bubble-pack mailer or other suitable protective packaging and label the package “Fragile: Handle With Care.”
- Do not remove hard drives from the shipping package for storage. Keep hard drives in their protective packaging until they are actually mounted in the workstation.
- Avoid dropping drives from any height onto any surface.
- If you are inserting or removing a hard drive, turn off the workstation. Do not remove a hard drive while the workstation is on or in standby mode.
- Before handling a drive, ensure that you are discharged of static electricity. While handling a drive, avoid touching the connector. For more information about preventing electrostatic damage, see “Electrostatic Discharge Information” on page 68.
- Do not use excessive force when inserting a drive.
- Avoid exposing a hard drive to liquids, temperature extremes, or products that have magnetic fields, such as monitors or speakers.

Lithium Coin Cell Battery

The battery that comes with the workstation provides power to the real-time clock and has a minimum lifetime of about three years.

For instructions on battery removal and replacement procedures, see “Battery” on page 100.

WARNING! This workstation contains a lithium battery. There is a risk of fire and chemical burn if the battery is handled improperly. Do not disassemble, crush, puncture, short external contacts, dispose in water or fire, or expose it to temperatures higher than 140º F (60º C).

CAUTION Do not dispose of batteries, battery packs, and accumulators together with the general household waste.

Pre-Disassembly Procedures

Before servicing the workstation:

1. Remove/disengage any security devices that prohibit opening the workstation.
2. Close any open software applications.
3. Remove any diskette or compact disc from the workstation.
4. Exit the operating system.
5. Turn off the workstation and any peripheral devices that are connected to it.
6. Remove/disengage any security devices that prohibit opening the workstation.

CAUTION Turn off the workstation before disconnecting any cables.

CAUTION The cooling fan is off **only** when the workstation is turned off or the power cable has been disconnected. The cooling fan is always on when the workstation is in the "On," "Standby," or "Suspend" modes. You must disconnect the power cord from the power source before opening the workstation to prevent system board or component damage.

7. Disconnect the power cord from the electrical outlet and then from the workstation.
8. Disconnect all peripheral device cables from the workstation. For more information, see "Electrostatic Discharge Information" on page 68.

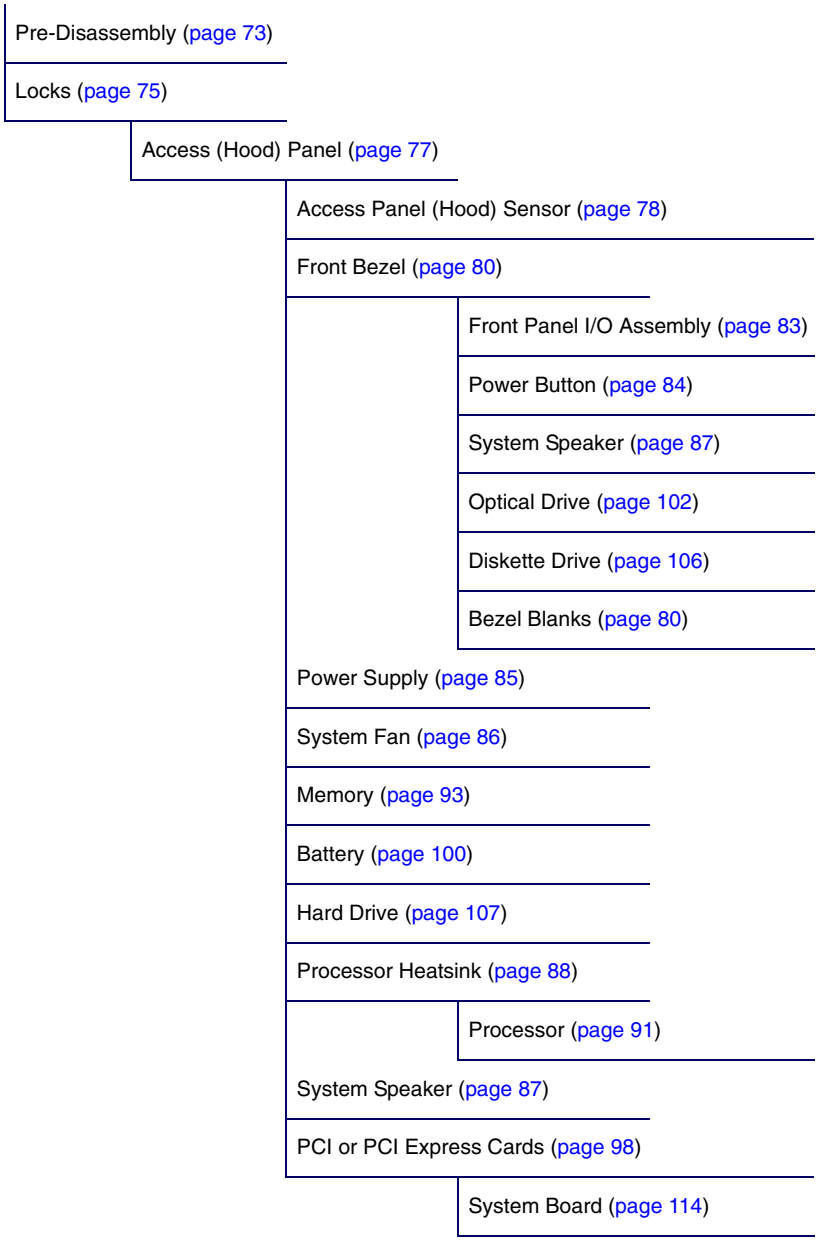
Removal and Replacement of Components

This section discusses the procedures necessary to remove and install various hardware components on your workstation. Review the safety and precautions and the "Service Considerations" on page 68, as well as the *Safety and Regulatory Guide,* before servicing or upgrading your system.

1. Read all safety information and precautions.
2. Locate and clear a suitable work area.
3. Shut down the system and remove power from the unit.
4. Gather your tools.
5. Service your unit.
6. Restore power to your unit.

Disassembly Order

Use the following table to determine the order in which to remove the major components.



Security Padlock (Optional)

If a security padlock is installed, remove it before servicing the unit. To remove the padlock, unlock it and slide it out of the padlock loop as shown in the following illustration.

Cable Lock (Optional)

If a cable lock is installed, remove it before servicing the unit. To remove the cable lock, unlock it and pull it out of the cable lock slot as shown in the following illustration.

Universal Chassis Clamp Lock (Optional)

If a universal chassis clamp lock is installed, remove it before servicing the unit. To remove the noble lock:

1 Unlock the screw cover from the universal clamp as shown in the following illustration.

2 Unscrew the universal clamp from the unit as shown in the following illustration.

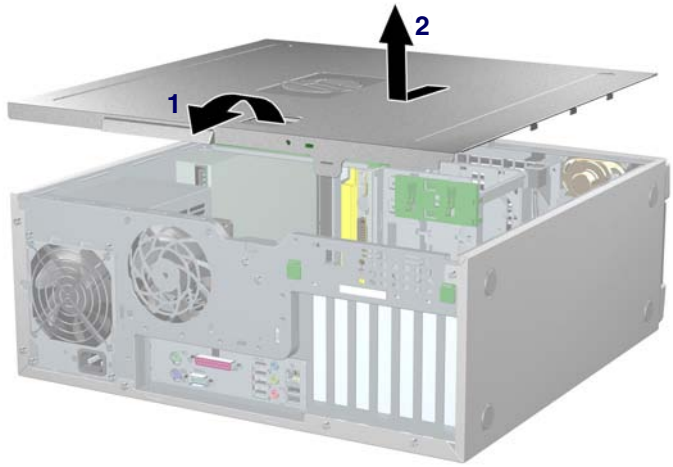
Access Panel

Before accessing the internal components of the HP Workstation xw4200, the access panel must be removed.

To remove the panel:

WARNING! Ensure that the workstation is turned off and that the power cord is disconnected from the electrical outlet before removing the workstation access panel.

1. Disconnect power from the system (page 73) and, if necessary, unlock the security lock and cable lock (page 75), and disconnect the universal clamp lock (page 76).
2. Lay the unit in the desktop position as shown in the following illustration.
3. Pull up and out on the cover latch **1** and at the same time slide the cover **2** away from the bezel and then lift up.



To replace the access panel, lay it flat on the unit about one inch from the bezel. The hooks should fall into the recesses. Then slide the cover towards the bezel until it snaps into place.

Access Panel (Hood) Sensor (Optional)

To remove the hood sensor:

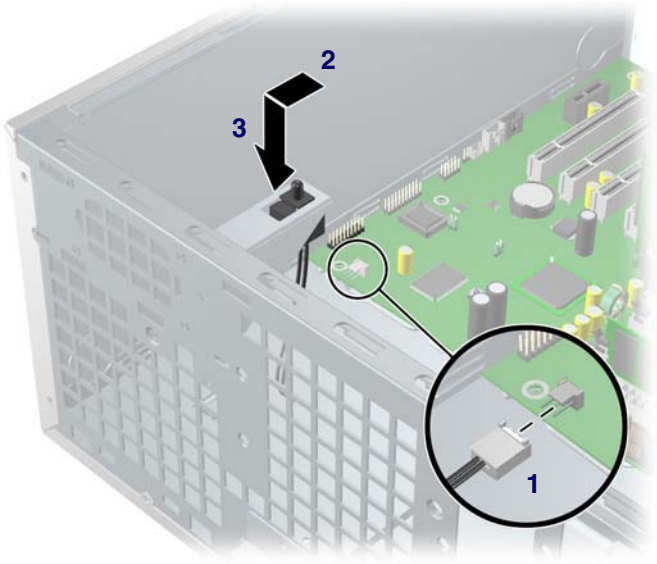
1 Disconnect power from the system (page 73) and remove the access panel (page 77).

2 Disconnect the hood sensor **1** from the system board.

3 Slide the hood sensor **2** forward as shown in the following illustration.

CAUTION The hood sensor bracket and the chassis contain sharp edges that present a safety hazard. Be careful when sliding the hood sensor forward.

4 Pull the hood sensor **3** down and remove it from the chassis.

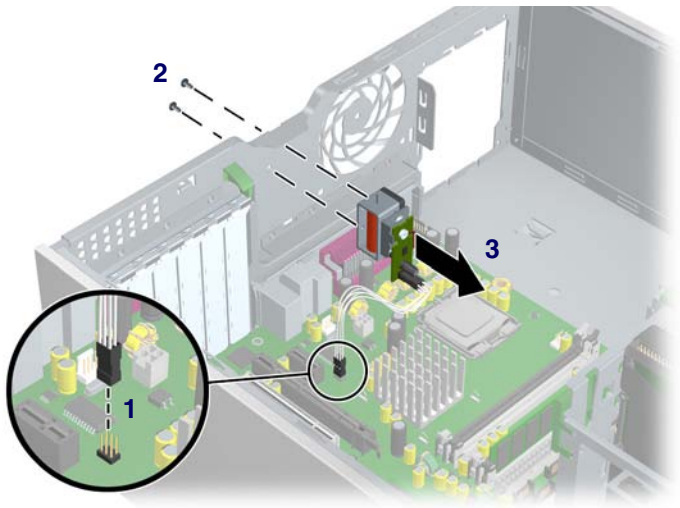


To replace the hood sensor, reverse the previous steps.

Solenoid Hood (Smart Cover) Lock (Optional)

To remove the solenoid lock:

1. Disconnect power from the system (page 73) and remove the access panel (page 77).
2. Disconnect the access panel lock cable **1** from the system board.
3. Using the FailSafe key, unscrew the two screws **2** from the back of the chassis as shown in the following diagram.
4. Slide the access panel lock assembly **3** away from the chassis and out of the unit.

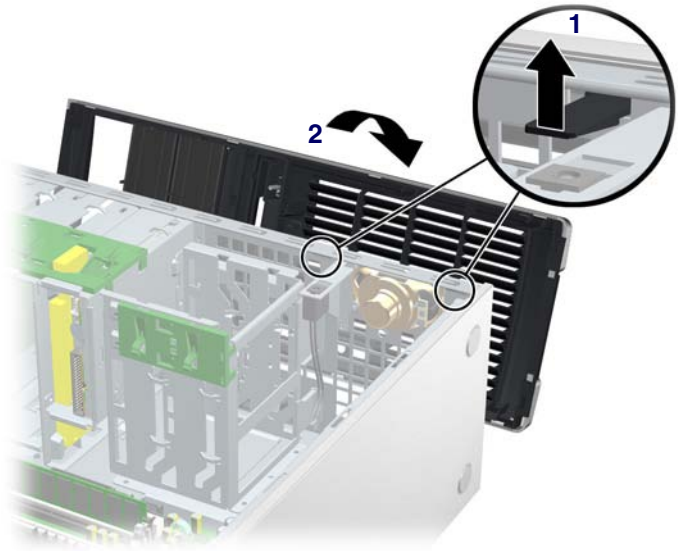


To replace the access panel lock assembly, reverse the previous steps.

Front Bezel

To remove the bezel:

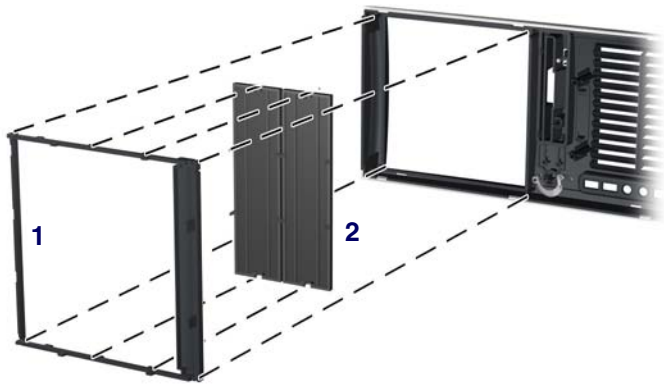
1. Disconnect power from the system (page 73) and remove the access panel (page 77).
2. Lift up on the two tabs **1** located on the front bezel.
3. Rotate the front bezel **2** away from the chassis as shown in the following illustration and remove the bezel.



Bezel Blanks

To remove the bezel blanks:

1. Disconnect power from the system (page 73), and remove the access panel (page 80) and front bezel. After removing the front bezel, gently pull the subpanel **1**, with the bezel blanks secured in it, away from the front bezel.
2. Remove the desired bezel blank **2** by pulling the blank away from the subpanel.



NOTE The bezel blanks are keyed to assist you in replacing the blanks. Also, the subpanel can be rotated 90 degrees to install the optical drives in desktop orientation, if desired.

Chassis Feet

The HP Workstation xw4200 ships in a minitower configuration and chassis feet are installed on the base of the workstation. The unit ships with additional feet should you convert the unit to a desktop.

To install the chassis feet on a desktop-oriented workstation:

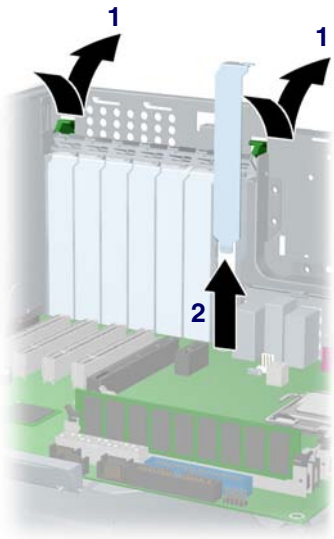
1 Situate the unit into the appropriate position as shown in the following illustration.

2 Place the feet into the embossed areas of the unit.

IEEE-1394 (Optional)

To install an optional IEEE-1394 adapter:

1 Unlatch the PCI levers **1** and the PCI slot cover **2**.

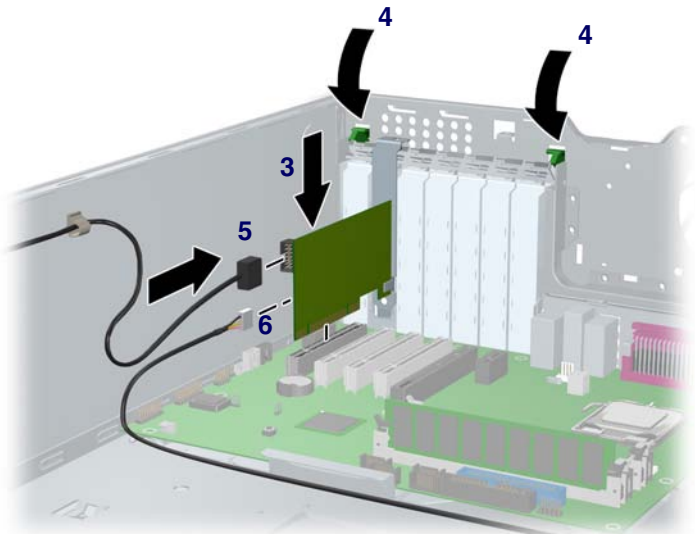


2 Install the IEEE-1394 card **3** into the PCI socket.

3 Close the PCI levers **4**.

4 Connect the front I/O cable **5** and power cable **6** into the card.

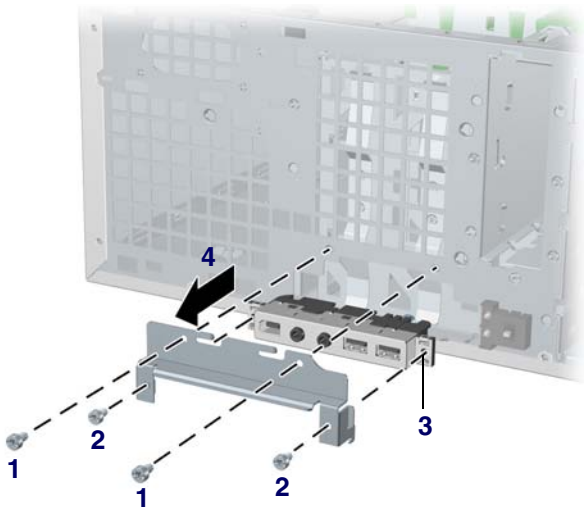
5 Remove the sticker covering the front IEEE-1394 connector.



Front Panel I/O Assembly

To remove the front panel I/O assembly:

1. Disconnect power from the system (page 73), remove the access panel (page 77), and remove the front bezel (page 80).
2. Disconnect the front panel I/O assembly cable from the system board.
3. Remove the two screws **1** that hold the assembly bracket to the chassis as shown in the following illustration.
4. Remove the two screws **2** that hold the bracket and assembly together and separate the shield away from the front panel I/O assembly **3**.
5. Slide the front panel I/O assembly **4** (with bracket attached) out about two inches away from the chassis.



WARNING! The next step requires the removal of cables through the chassis. Some edges on the chassis might be sharp. Care must be taken when removing these cables.

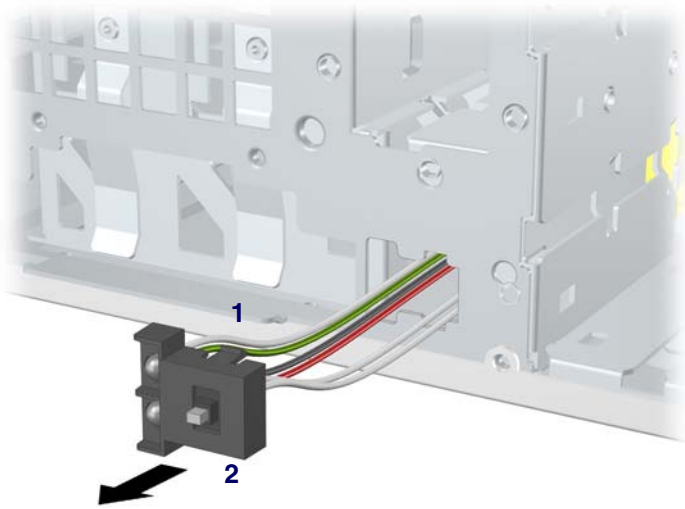
6. Slide the front panel cables through the chassis and out the front of the unit.

To replace the front panel I/O assembly, reverse the previous steps.

Power Button Assembly

To remove the front power button assembly:

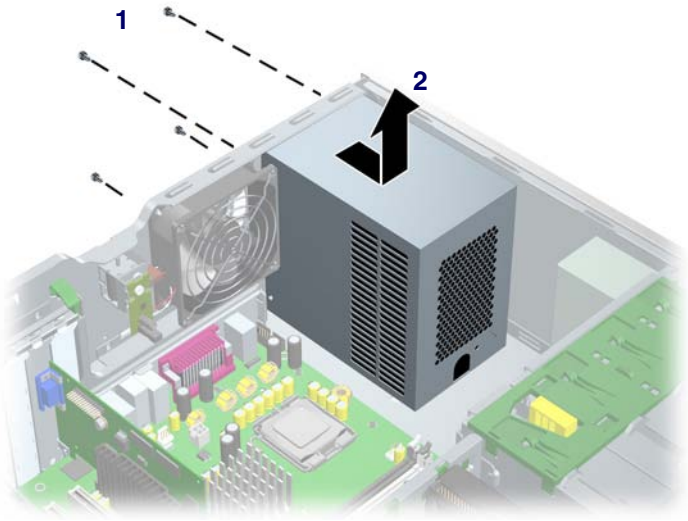
1. Disconnect power from the system (page 73), remove the access panel (page 77), remove the front bezel (page 80), and remove the front panel I/O assembly (page 83).
2. Disconnect the power assembly cable from the system board.
3. Press the clips at the top **1** and bottom **2** of the power assembly, then slide the assembly out from the front of the chassis as shown in the following illustration.



Power Supply

To remove the power supply:

1. Disconnect power from the system (page 73) and remove the access panel (page 77).
2. Disconnect the power supply from the system board.
3. Disconnect all devices (optical drives, diskette drive, hard drives, and on select models, the graphics card and IEEE-1394 card) from the power supply.
4. Remove the four screws **1** from the back panel.



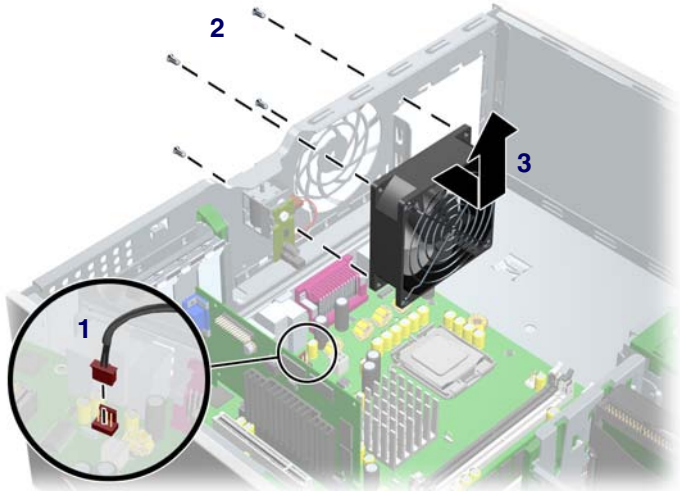
5. Slide the power supply **2** toward the front and lift up to remove it from the chassis.

To install the power supply, reverse the previous steps.

System Fan

To remove the system fan:

1. Disconnect power from the system (page 73) and remove the access panel (page 77).
2. Disconnect the fan connector **1** from the system board.
3. Remove the four screws **2** from the back of the chassis back panel with a Phillips screwdriver.



4. Slide the fan **3** toward the front of the unit and remove it.

To replace a system fan, reverse the previous steps.

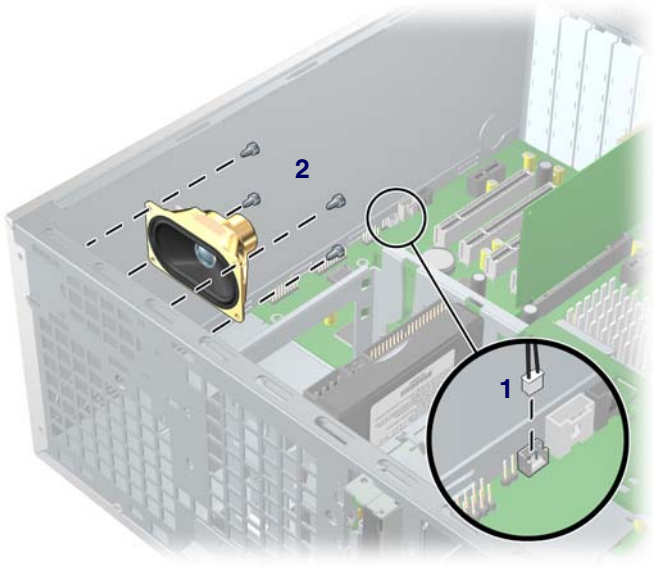
CAUTION When installing the system fan, ensure that the fan is situated so that the airflow direction is going out of the chassis.

NOTE This system only supports 4-wire fans.

System Speaker

To remove the speaker:

1. Disconnect power from the system (page 73) and remove the access panel (page 77).
2. Disconnect the speaker **1** from the system board.
3. Remove the four screws **2** as shown in the following illustration.



4. Pull the speaker out of the chassis.

To replace the speaker, reverse the previous steps.

Processor Heatsink

NOTE The following illustrated heatsink is typical of what you might have in your workstation. Be aware that different versions of the heatsinks exist, but the overall procedures listed are sufficient to assist you in removing the heatsink.

Removing the Heatsink

To remove the heatsink:

1 Turn on the workstation and enter Computer Setup (F10) (page 34). Let the workstation run in this mode for five minutes.

This action warms the thermal interface material between the heatsink and processor so that the thermal bond loosens, and can more easily be broken.

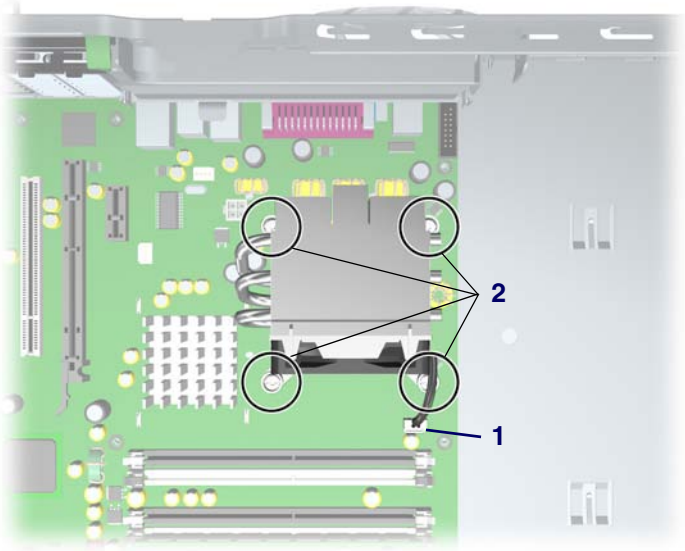
NOTE Windows in idle state does not provide sufficient heat to warm the compound.

2 After warming the thermal interface, shut down the system, disconnect power from the system (page 73), and remove the access panel (page 77).

3 Disconnect the heatsink wire **1** from the system board as shown in the two illustrations below.

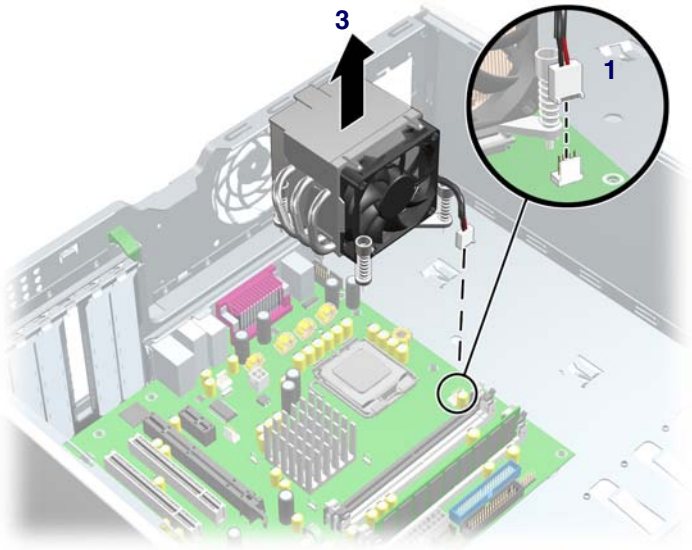
4 Remove the captured heatsink screws **2** from the system board. Begin by slightly loosening any two screws that diagonally opposite from one another, then slightly loosen the other two. Then finish removing the screws.

5 Gently twist the heatsink unit to break the thermal grease binding.



6 Lift the heatsink **3** unit. Use alcohol and a soft cloth to clean all the thermal interface material residue from the processor heatsink and processor.

CAUTION Allow the alcohol on the processor heatsink to dry completely.



Replacing the Heatsink

To replace the heatsink:

1. Disconnect power from the system (page 73), remove the access panel (page 77), and remove the heatsink (page 88).
2. Use alcohol and a soft cloth to clean all the thermal interface material residue from the processor heatsink and processor.

CAUTION Allow the alcohol on the processor heatsink to dry completely.

Apply new thermal grease between the heatsink and processor, then reverse the previous steps. When tightening the four heatsink screws, do not fully tighten one screw, then move on to the next. Carefully tighten all screws a little at a time, making sure the processor remains level and making sure you do not overtighten the screws. If you have a torque-limited driver available, tighten the screws to the correct torque setting of 6 in-lbs.

CAUTION Do NOT overtighten the screws. If you overtighten the screws, you risk stripping the threads in the system board tray.

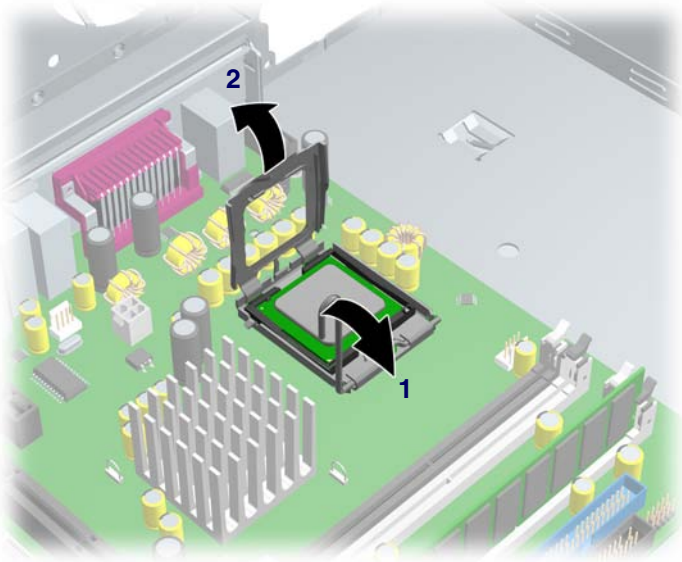
NOTE This system only supports 4-wire fans.

Processor

To remove the processor:

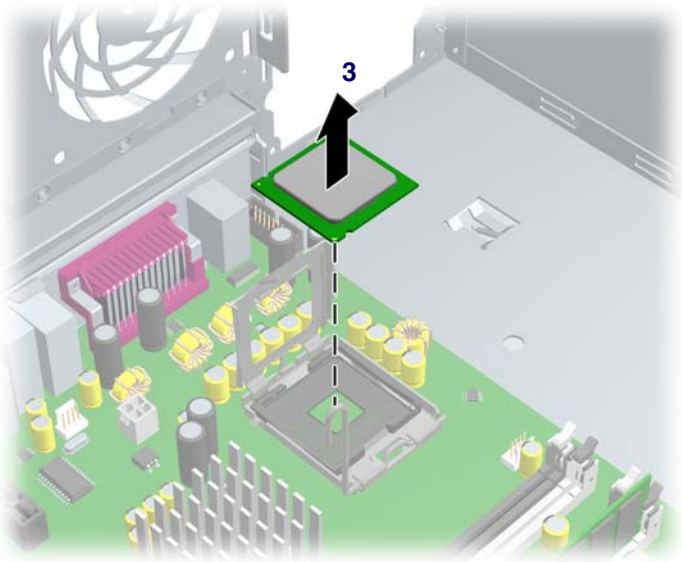
1 Disconnect power from the system (page 73), remove the access panel (page 77), and remove the heatsink (page 88).

2 Raise the lever **1** on the processor socket handle and open the cover **2**.



3 Pull the processor **3** straight out of the socket.

CAUTION If you damage the spring-loaded contacts in the socket, the system board may be damaged and your warranty voided.



NOTE Store the processor in a safe place where it will not be damaged.

To replace the processor:

1 Raise the processor socket handle fully (the full swing angle of the lever is approximately 135 degrees).

CAUTION The contacts in the socket are delicate. Use extreme care when placing the processor in the socket.

2 Line up the triangle on the corner of the processor with the triangle on the corner of the processor socket and install the processor into the socket. Ensure that the underside of the processor is level with the top of the top of the processor socket. Lightly press down on the top of the processor while closing the socket lever.

Memory

The HP Workstation xw4200 has four memory sockets. The system supports industry-standard, 240-pin DDR2 DIMMs.

The system can support up to 4 GB of memory (1-GB DIMM in each socket). Although a single 128-MB DIMM configuration is possible (on XMM1 only), always install DIMMs in pairs for optimal dual-channel operation.

Memory Module Requirements

- Use only industry standard, unbuffered, PC2-3200 or PC2-4300 DIMMs.
- Install unbuffered DDR2 DIMMs in pairs of matched size and type.
- Registered memory is not supported.

Removing Memory Module

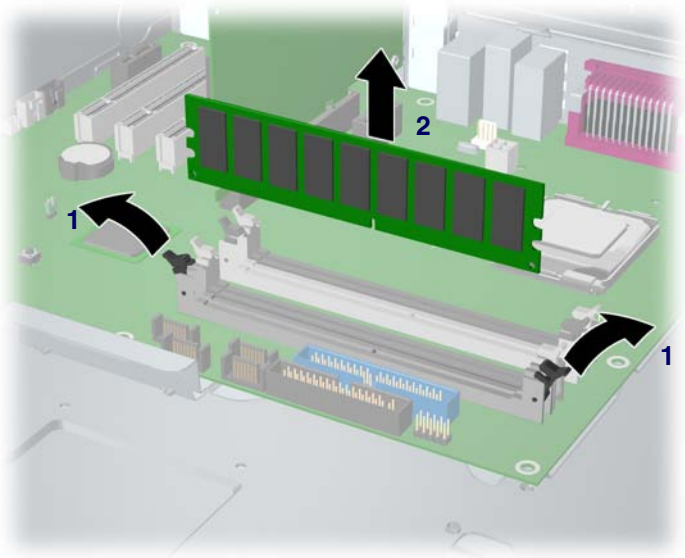
To remove DIMMs from the unit:

1 Disconnect power from the system (page 73), remove the access panel (page 77), and lay the workstation on its side with the system board facing up.

CAUTION To ensure that memory modules are not damaged during removal or installation, power off the workstation and unplug the power cord from the AC power outlet. Wait until the LED on the back of the power supply turns off before removing memory. If you do not unplug the power cord while installing memory, your memory modules might be damaged and the system will not recognize the memory changes.

2 Gently push outwards on the socket levers **1** as shown in the following illustration.

3 Lift the DIMM **2** straight up and remove it from the unit.



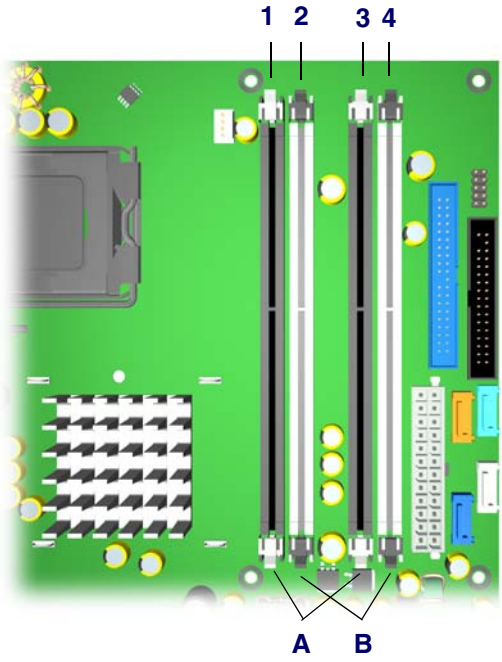
To replace memory, reverse the previous steps.

NOTE DIMMs and the DIMM sockets are keyed for proper installation. Make sure the guides line up when installing a DIMM.

Installing Memory Module

You must load memory modules in valid configurations.

- If using only one DIMM, install it in socket 1
- Load the first DIMM pair A into sockets 1 and 3.
- Load the second DIMM pair B into sockets 2 and 4.



Peripheral Component Interconnect (PCI) Slots

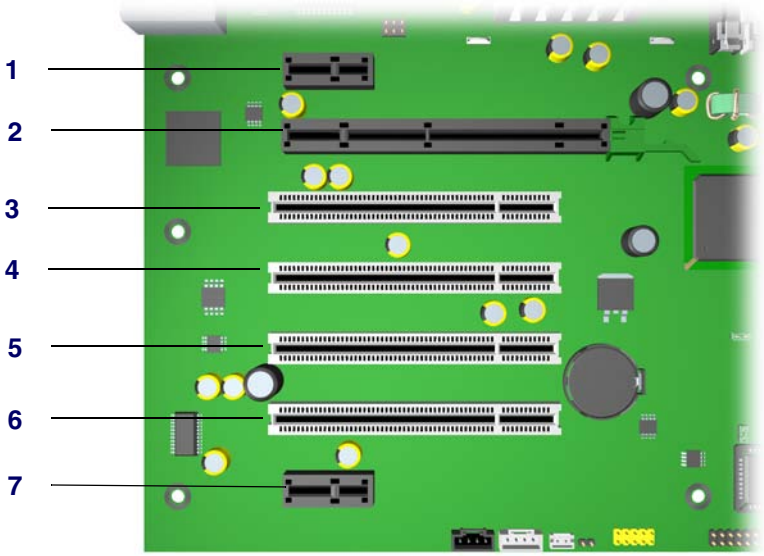


Table 4-3 PCI Slots

Slot	Type	Ref	IDSEL	INTs	PME
1	PCI Express x1	J34	N/A	A B C D	PCI_EXP_WAKE#
2	PCI Express x16	J41	N/A	A B C D	PCI_EXP_WAKE#
3	PCI	J20	AD20	A C F G	P_PME#
4	PCI	J21	AD25	C F G A	P_PME#
5	PCI	J22	AD26	F G A C	P_PME#
6	PCI	J23	AD27	G A C F	P_PME#
7	PCI Express x1	J31	N/A	A B C D	PCI_EXP_WAKE#

Table 4-4 PCI Devices List

Device	Bus	Dev	FN	PFA	Interrupts
Processor to I/O Controller	0	0	0	0000	
MCH PCI Express Root Port (slot 2)	0	1	0	0008	A
ICH6R PCI Express Root Port (Slot 1)	0	28	0	00E0	A
ICH6R PCI Express Root Port (Slot 7)	0	28	1	00E1	B
ICH6R PCI Express Root Port (LAN)	0	28	3	00E3	D

Table 4-4 PCI Devices List

Device	Bus	Dev	FN	PFA	Interrupts
ICH6R USB Universal Host Controller	0	29	0	00E8	A
ICH6R USB Universal Host Controller	0	29	1	00E9	B
ICH6R USB Universal Host Controller	0	29	2	00EA	C
ICH6R USB Universal Host Controller	0	29	3	00EB	D
ICH6R USB2 Enhanced Host Controller	0	29	7	00EF	A
ICH6R PCI Bridge	0	30	0	00F0	
ICH6R AC '97	0	30	2	00F2	A
ICH6R LPC Interface Controller	0	31	0	00F8	
ICH6R Ultra ATA Storage Controllers	0	31	1	00F9	A
ICH6R SATA Controller	0	31	2	00FA	B
Slot 2 (PCI Express x16)	1	0	0	0100	ABCD
Slot 3 (PCI)	5	4	0	0520	ACFG
Slot 4 (PCI)	5	9	0	0548	CFGA
Slot 5 (PCI)	5	10	0	0550	FGAC
Slot 6 (PCI)	5	11	0	0558	GACF
Slot 1 (PCI express x1)	32	0	0	2000	ABCD
Slot 7 (PCI Express x1)	64	0	0	4000	ABCD
Gigabit LAN Controller	128	0	0	8000	A

PCI Express

PCI Express is a new hardware interconnect standard (for example, I/O slots). PCI Express is point-to-point architecture and uses a serial data transmission protocol. A single PCI Express lane consists of 4 wires and is capable of transmitting 250 MB/sec in a single direction or 500 MB/sec in both directions simultaneously. This bandwidth is not affected by what is happening on other PCI Express buses or legacy PCI/PCI-X buses (provided that total bandwidth can be handled by the CPU and the memory subsystem). The transmission protocol is somewhat similar to that used for a LAN connection and contains error correction and detection, packet addressing and other network features.

PCI Express improves system attributes. PCI Express enables a low-power, scalable, high-bandwidth communication path with a small number of connections (wires) compared to traditional parallel interfaces (for example, PCI).

The PCI Express I/O slots can support other PCI Express cards with lesser bus bandwidth than what is physically defined for the slot. Use the following table to determine compatibility.

For example, a PCI Express x4 card does not work in a PCI Express x16 slot, but a PCI Express x16 card works in a PCI Express x16 slot.

Table 4-5 PCI Express Compatibility Matrix for xw4200

	PCI Express x1 Slot	PCI Express x4 Slot	PCI Express x8 Slot	PCI Express x16 Slot
PCI Express x1 Card	Y	not available	not available	Y
PCI Express x4 Card	N	not available	not available	N
PCI Express x8 Card	N	not available	not available	N
PCI Express x16 Card	N	not available	not available	Y

PCI or PCI Express Removal

To remove a PCI or PCI Express card:

1. Disconnect power from the system (page 73), remove the access panel (page 77), lay the workstation on its side with the system board facing up, and remove the PCI retainer (page 97).
2. Lift the PCI levers **1** by first pressing down on them and then out.
3. Lift the PCI card (**2**, left) out of the chassis. If removing a PCI Express card (**2**, right), remove the power supply cable (not shown), if required, and move the “hockey stick” lever **3** to release the card and lift it out of the chassis. Store the card in an anti-static bag.
4. Close the PCI levers.

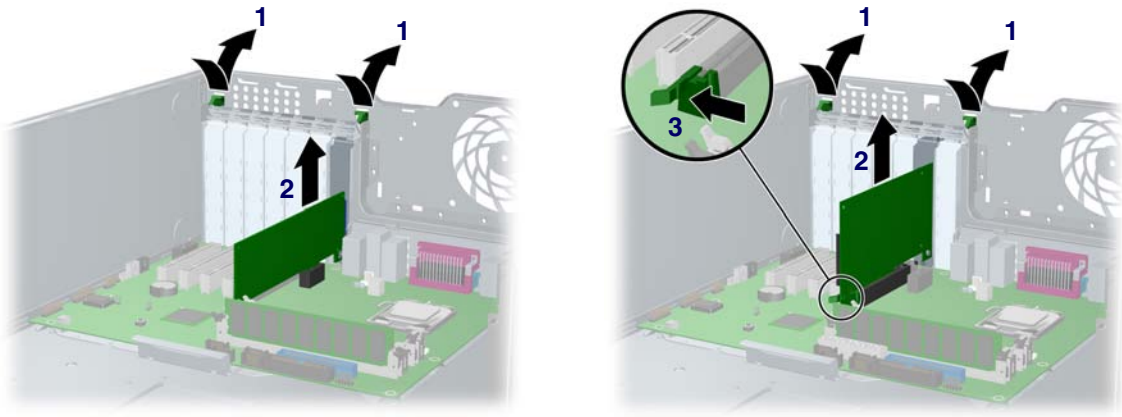


Figure 4-1 PCI card removal (left) and PCI Express card removal (right)

PCI or PCI Express Installation

To install a PCI or PCI Express card:

1. Disconnect power from the system (page 73), remove the access panel (page 77), lay the workstation on its side with the system board facing up, and remove the PCI retainer (page 97).
2. Lift the PCI levers **1** by first pressing down on them and then out.
3. Remove the PCI slot cover **2**.
4. Install the PCI card (**3**, left) or PCI Express card (**3**, right) into the chassis. Verify that the keyed components of the card align with the PCI socket. If installing a PCI Express card, plug in the power supply cable, if required.
5. Close the PCI levers **4**. If the PCI levers do not close, be sure all cards are properly seated and then try again.
6. If installing a PCI Express card, plug in the power supply cable **5**, if required.

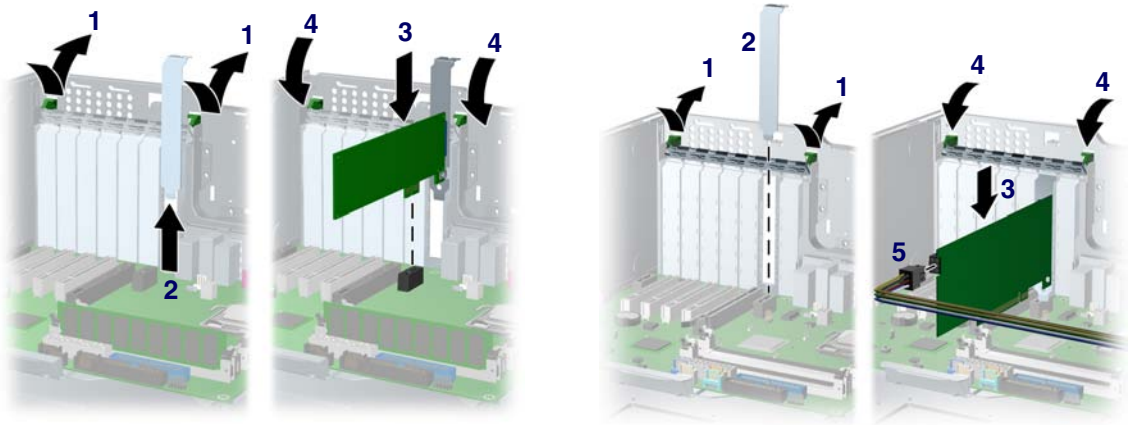


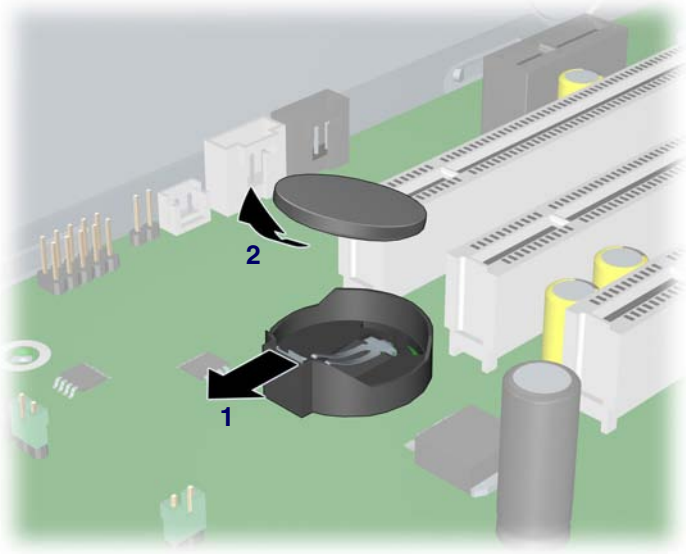
Figure 4-2 PCI card installation (left) and PCI Express Card Installation (right)

Battery

CAUTION Back up your CMOS (complementary metal oxide semiconductor) settings before removing the battery, as all CMOS settings will be lost when the battery is removed. To back up the CMOS settings, in (F10 Setup click **File>Replicated Setup>Save to Removable Media**.

To remove the battery:

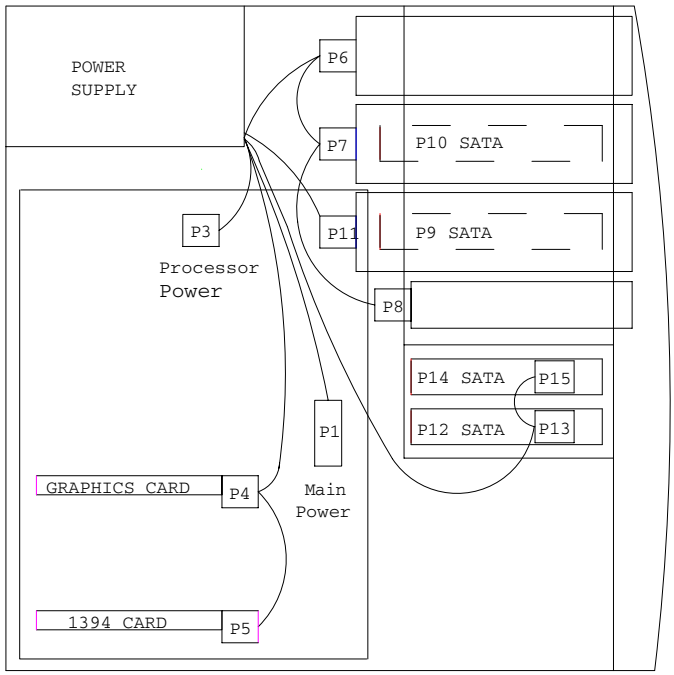
1. Disconnect power from the system (page 73), remove the access panel (page 77), and lay the workstation on its side with the system board facing up.
2. Press on the release tab **1** of the battery holder as shown in the following illustration.
3. Slide and lift the battery **2** out.



To install the battery, slide the battery back in until it snaps back into place.

Power Connections to Drives

For help in identifying power cables, refer to the following illustration. Route or tie cables so that they cannot interfere with the heatsink fans.



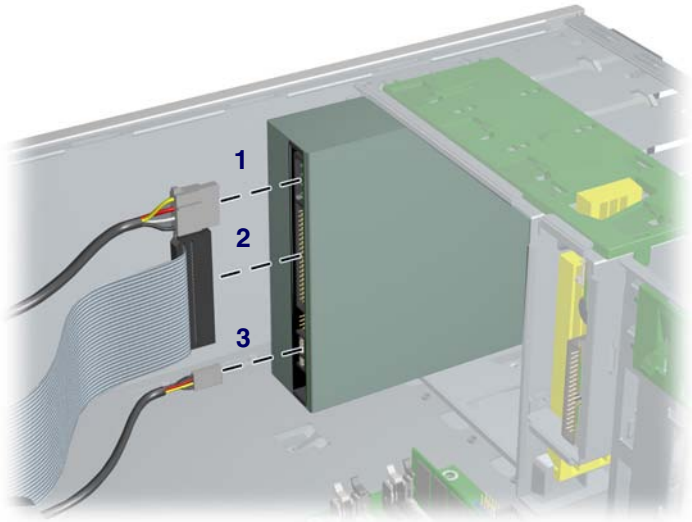
Optical Drive (Minitower Position)

To remove an optional optical drive, you must first release the drivelock. To release the optical drive:

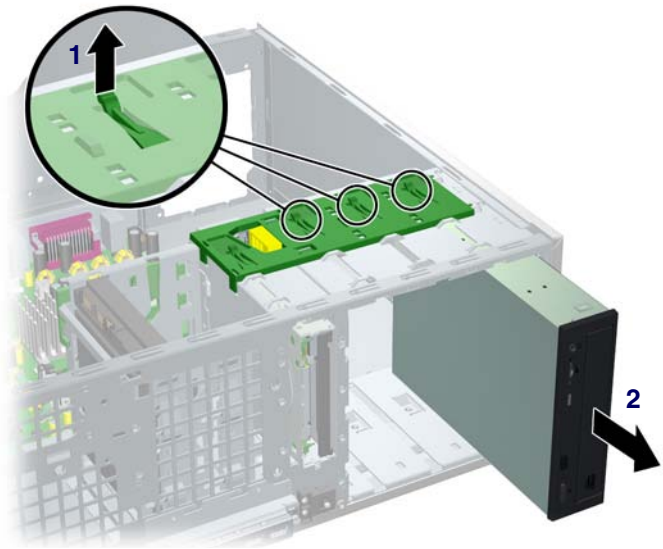
1 Disconnect power from the system (page 73), remove the access panel (page 77), and lay the workstation on its side with the system board facing up.

2 Disconnect the power **1**, drive **2**, and audio **3** cables from the drive.

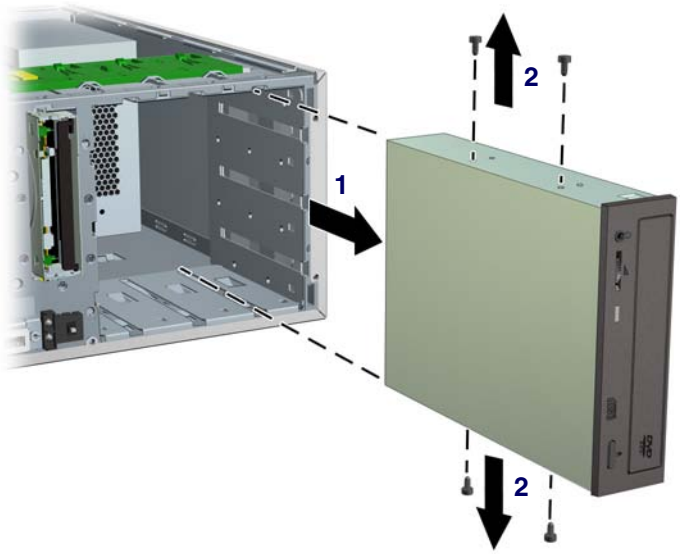
NOTE The audio cable is included with Linux-based systems only. Windows-based systems do not require the audio cable.



3 After removing the front bezel and bezel blanks, lift the green drivelock release lever **1** and gently slide the drive **2** out of the chassis.



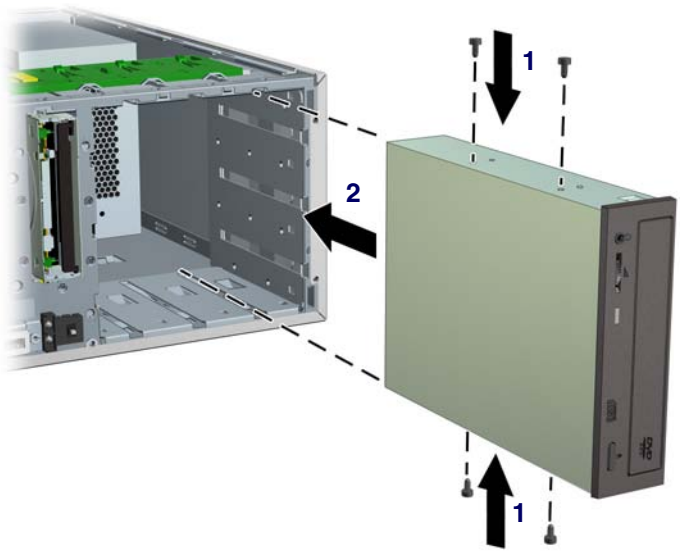
4 After pulling the drive **1** out, remove the four guide screws **2** from the drive.



5 Verify the jumper settings of the new drive are set correctly.

6 To install a drive, first remove the front bezel (page 80) and bezel blanks (page 80). Insert the four guide screws **1** into the drive. Align the screws with the slots on the drive, and slide the drive **2** into the unit until it snaps into place.

NOTE All optical drives may not fit in the bottom optical bay due to interference with the system board. Check the fit of your drive before installing it into the bay.



7 Connect the drive, power, and audio cables.

NOTE The audio cable is included with Linux-based systems only. Windows-based systems do not require the audio cable.

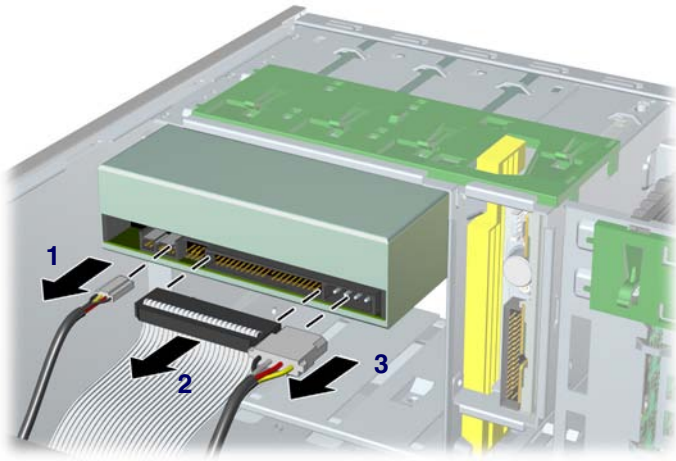
Optical Drive (Desktop Position)

To remove an optional optical drive, you must first release the drivelock. To release the optical drive:

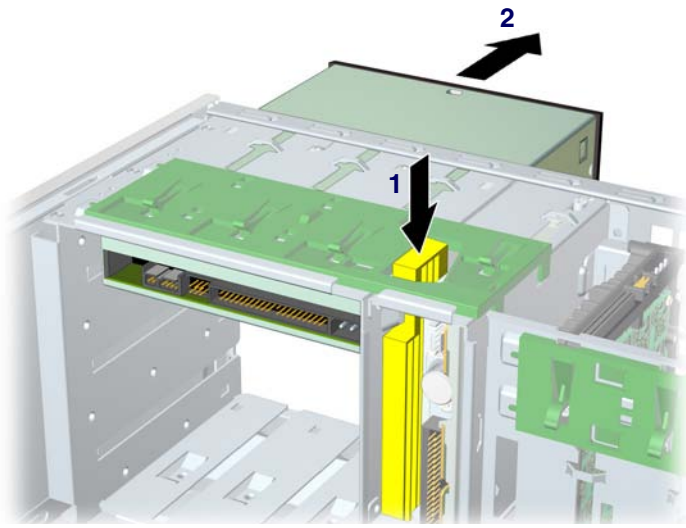
1 Disconnect power from the system (page 73), remove the access panel (page 77), and lay the workstation on its side with the system board facing up.

2 Disconnect the audio **1**, drive **2**, and power **3** cables from the drive.

NOTE The audio cable is included with Linux-based systems only. Windows-based systems do not require the audio cable.



3 After removing the front bezel and bezel blanks, press down on the yellow drivelock. As you press on the yellow drivelock **1**, gently slide the drive **2** out of the chassis.



4 After pulling the drive **1** out, remove the four guide screws **2** from the drive.

5 Verify the jumper settings on the new drive are set correctly.

6 To install a drive, insert the four guide screws **1** into the drive. Align the screws with the slots on the drive, and slide the drive **2** into the unit until it snaps into place.

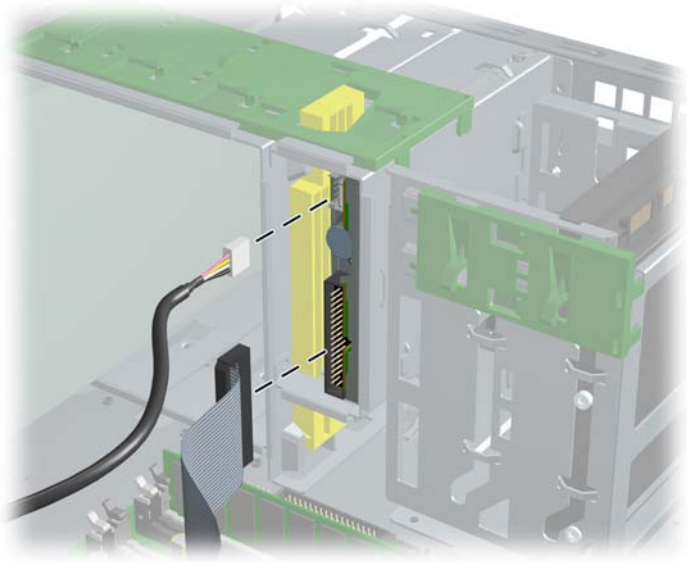
7 Connect the drive, power, and audio cables.

NOTE The audio cable is included with Linux-based systems only. Windows-based systems do not require the audio cable.

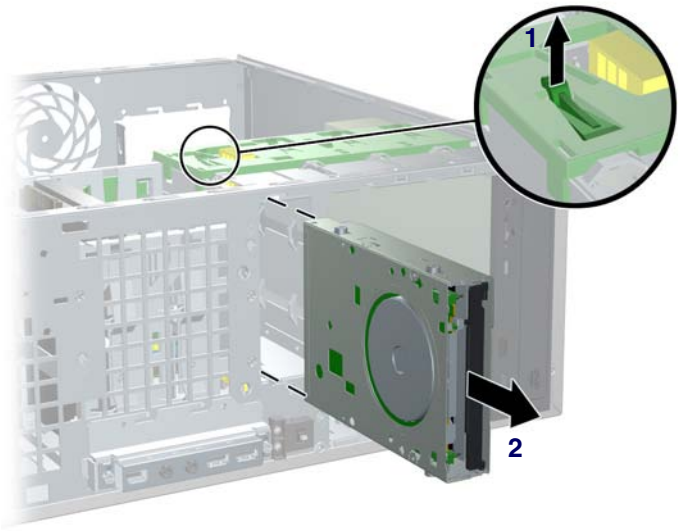
Diskette Drive (Optional)

To remove an optional diskette drive:

1. Disconnect power from the system (page 73), remove the access panel (page 77), and remove the front bezel (page 80).
2. Disconnect the cables from the back of the diskette drive.



3. After removing the front bezel and bezel blanks, lift the green drivelock release tab **1** and slide the drive **2** out at the same time.



To replace an optional diskette drive, reverse the previous steps. Align the screws with the slots on the drive, and slide the drive into the unit until it snaps into place.

Hard Drive

This section describes how to install SCSI and SATA hard drives.

SCSI

For more information on SCSI hard drives, see "SCSI Devices" on page 153.

Before installing a SCSI hard drive on your workstation, you must give the hard drive a unique SCSI ID.

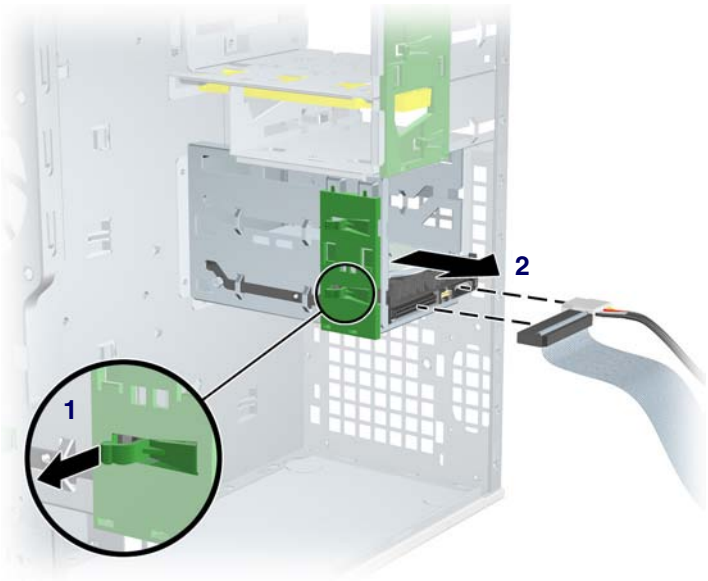
All SCSI controllers require a unique SCSI ID (0–15) for each SCSI device installed. The controller identifies a SCSI device by its SCSI ID number rather than its location. Moving a SCSI device from one position to another on the SCSI chain does not affect communication between the controller and the device. The reserved and available SCSI ID numbers for SCSI devices are as follows:

- 0 is reserved for the primary hard drive (not reserved for the primary hard drive on Linux).
- 7 is reserved for the SCSI controller.
- 1 through 6 and 8 through 15 are available for all other SCSI devices.

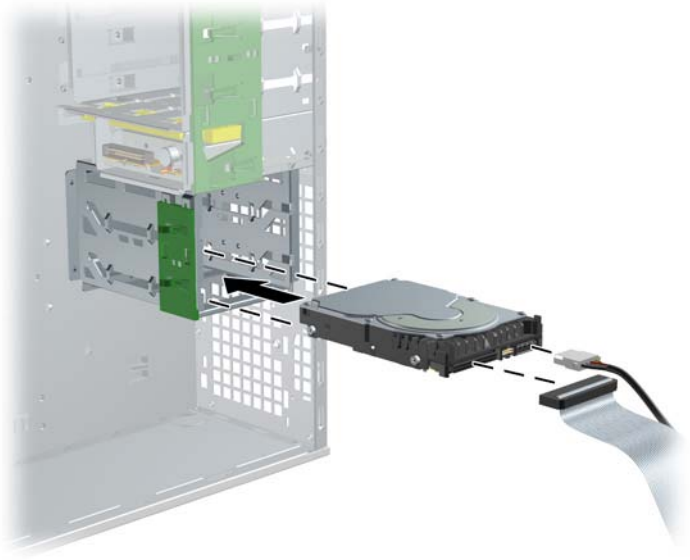
Once you have given the hard drive a unique SCSI ID, you can install the hard drive into your workstation.

To remove a SCSI hard drive:

1. Disconnect power from the system (page 73), remove the access panel (page 77), and lay the workstation on its side with the system board facing up.
2. Disconnect the cables from the back of the hard drive.
3. Lift up on the green drivelock release tab **1** and slide the hard drive **2** out of the chassis at the same time.



To install a hard drive, reverse the previous steps, but verify that the jumper settings are set as shown in the following illustration.



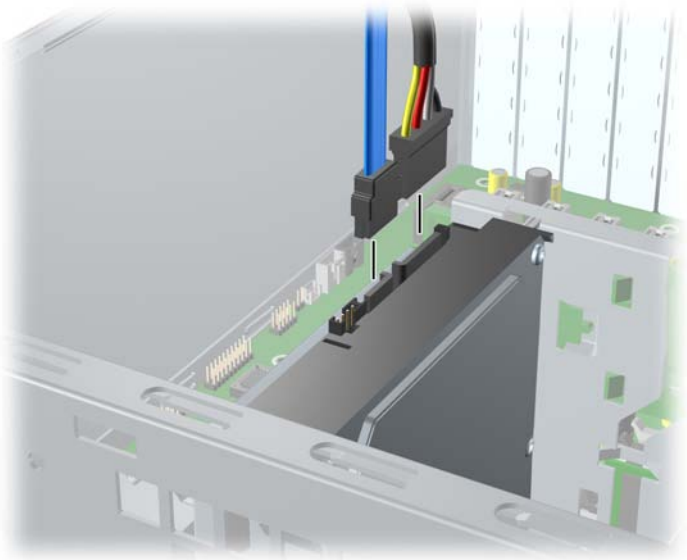
SATA

For more information on SATA hard drives and the SATA RAID configuration, see “SATA Devices” on page 157.

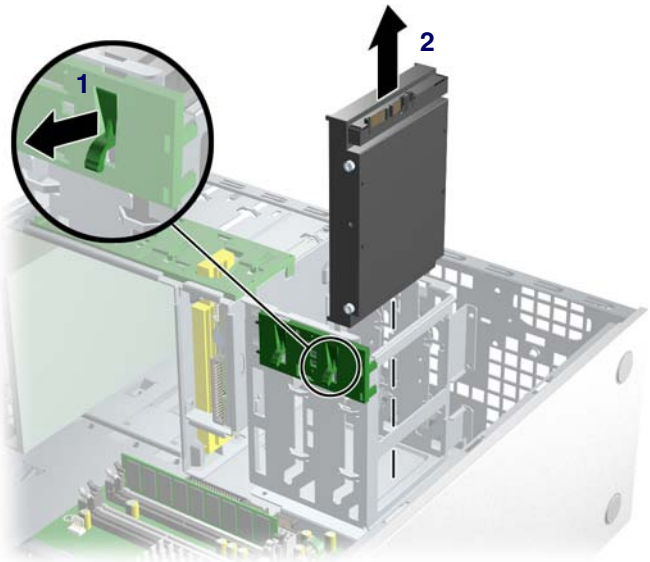
To remove a SATA hard drive:

1 Disconnect power from the system (page 73), remove the access panel (page 77), and lay the workstation on its side with the system board facing up.

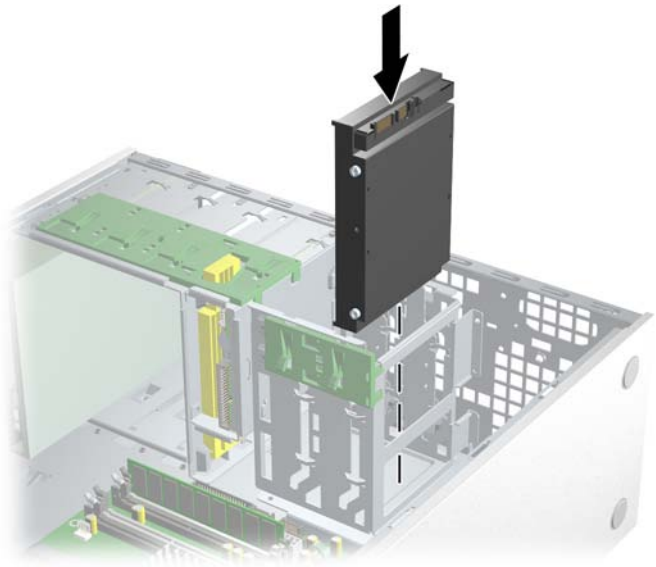
2 Remove the cables as shown in the following illustration.



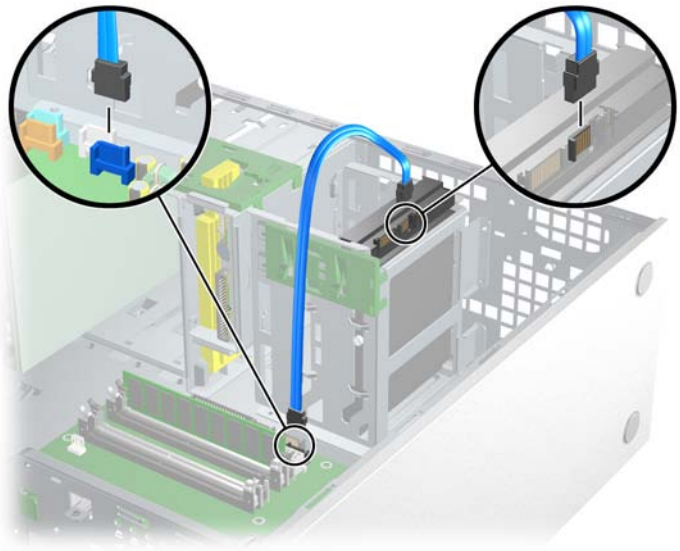
3 Pull the release latch **1** and remove the SATA drive **2** as shown in the following illustration.

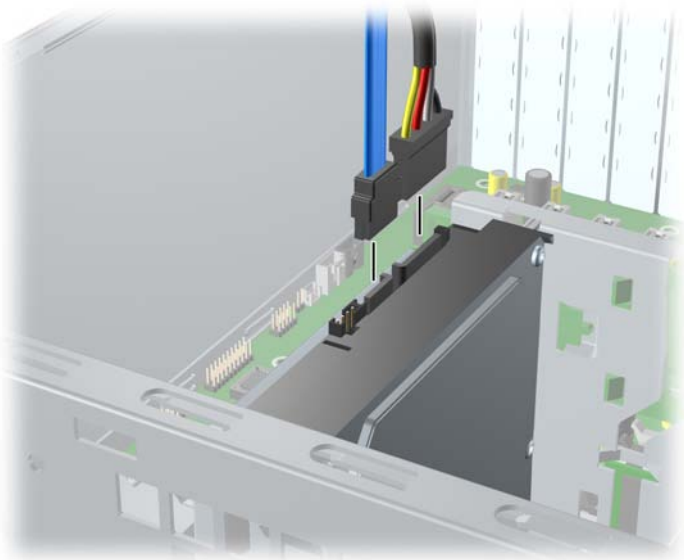


4 Install the SATA drive as shown in the following illustration.



5 Connect the cables as shown in the following illustrations.

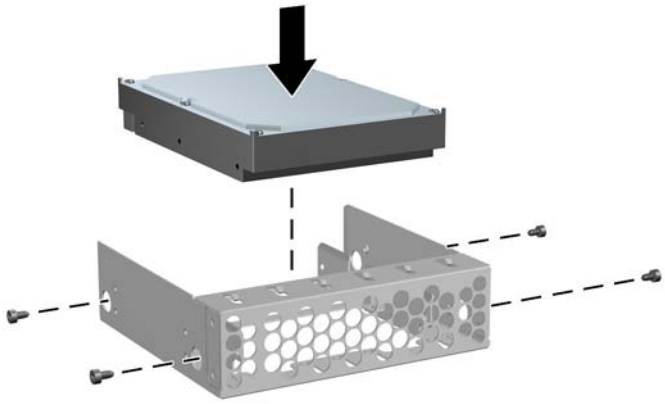




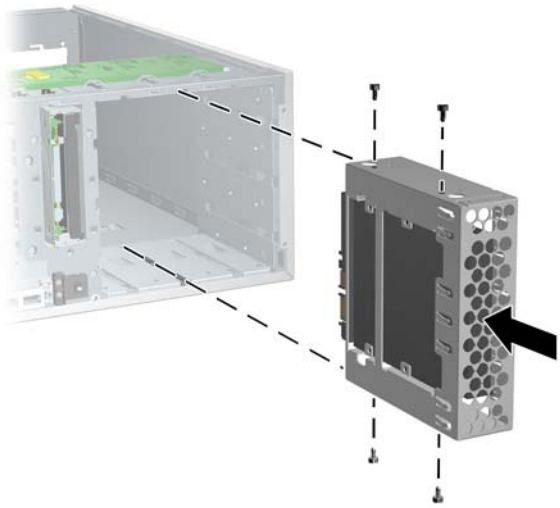
6 Close up the unit by reversing the procedures listed in step 1.

Installing Hard Drives in the 5.5” slot (Optional)

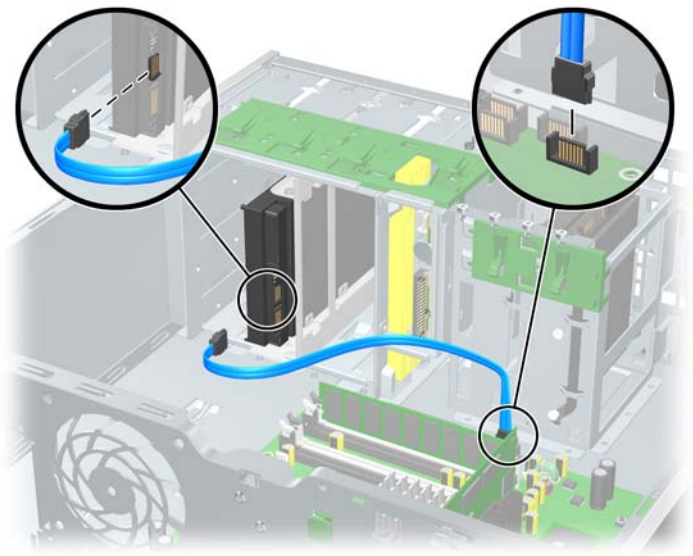
1 Place the hard drive in the bracket and secure with American National screws (page 70) as shown in the following illustration.



2 Remove the front bezel (page 80), then slide the bracket into the slot, and secure the drive to the chassis by tightening the four screws as shown in the following illustration.



3 Connect the cables as shown in the following illustration (SATA style drive shown).



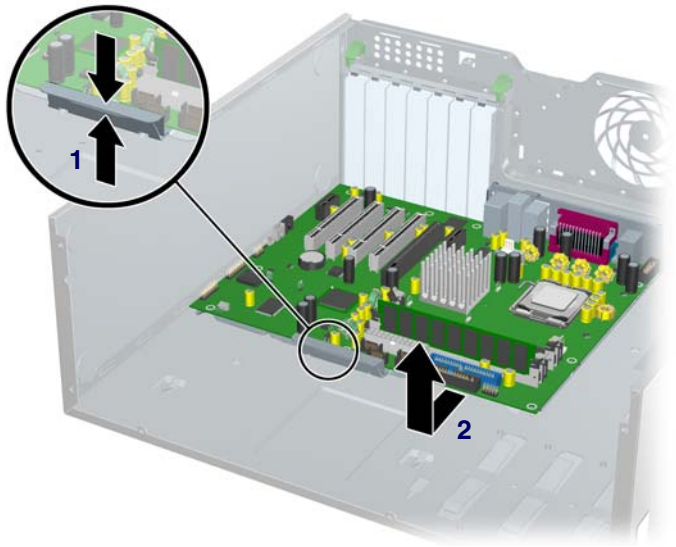
System Board

To remove the system board:

1. Disconnect power from the system (page 73), remove the access panel (page 77), lay the workstation on its side with the system board facing up, remove all expansion boards and graphics cards (page 97), and remove the processor heatsink (page 88).
2. Disconnect all cabling from the system board to disengage the plastic mounting standoffs from the chassis.

NOTE Make note of the cable connections before disconnecting them from the system board.

3. Press the release tab **1** as shown in the following illustration.
4. Slide the board **2** toward the front of the chassis and then lift it out of the unit.



To replace the system board:

1. Lay the system board back in the chassis slightly away from the rear of the chassis. The mounting hooks should fall into the recesses of the tray so the tray lays flat on the chassis base.
2. Slide the tray towards the rear of the chassis until the heat sink mounting holes line up.
3. Re-install the heatsink, cards, and cables.